METHOD FOR CONDUCTING CAPILLARY ZONE ELECTROPHORESIS

RELATED APPLICATIONS

The present application claims priority to U.S. Provisional Application No. 60/177,652, filed January 27, 2000.

TECHNICAL FIELD

The present invention is directed to the general area of capillary zone electrophoresis. More particularly, it is directed to additives which extend the life of a capillary so that it can be used for several electrophoresis runs while still providing good separation resolution and reproducible results from run to run.

BACKGROUND

Fig. 1 shows a typical arrangement 100 for conducting capillary electrophoresis. A capillary 102 having a window region 104 has its ends dipped in buffer 106. A sample 108 to be electrophoresced is introduced at one of the capillary's ends and a voltage differential is applied across the two ends. This causes the sample 108 to separate into its components, each of which migrate at different rates in the direction depicted by the arrow. A laser light source 110 is used to illuminate the samples, which typically are tagged with a chromophore. In response to this excitation, the samples emit light 112 which is then captured by a camera 114, after which the results are processed by a computer 116.

In the configuration described, the capillaries are used a number of times before they are discarded. Without some form of capillary cleaning, however, a small quantity of a sample, such as protein, may get absorbed on the inner wall of the capillary, thereby contaminating a subsequent electrophoresis run. Therefore, between each electrophoresis run, a capillary is typically rinsed, usually under high pressure. Although a variety of cleaning solutions may be employed to rinse a capillary, one of the more popular rinses is NaOH, such as in the concentration of 50 mM to 200 mM. The NaOH solution is pumped through the capillaries to help remove residual traces of the electrophoretic medium and the sample which migrated therein.

SUMMARY OF THE INVENTION

The present invention is realized by adding a predetermined quantity of a lubricating detergent to at least one of the buffer and the sample to be separated before a capillary electrophoresis run. In a preferred embodiment, the lubricating detergent is a sodium dodecylsulfate (SDS) solution.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention can better be understood through the attached figures in which:

Fig. 1 shows the prior art environment in which the present invention may be used; and

Fig. 2 shows experimental results demonstrating the repeatability of results using the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Experiments were run to evaluate the use of SDS. The configuration of the equipment was as follows: Multiple parallel capillaries were used. Each capillary had an inner diameter of 50 μm, and outer diameter of 150 μm, and a total length of 50 cm, with an effective length of 40 cm from the sample end to the window detection region through which light from a chromophore associated with the sample, can be detected. Excitation was provided by an all-length 200 mW AR-ion laser shining at the capillaries. A CCD camera configured substantially in the manner disclosed in U.S. Patent No. 5,998,796, captured the spectra-resolved images. The voltage applied across the capillary ends was + 10 kV at the injection end. The buffer used during electrophoresis was 10 mM borate acid having a pH of 10.5. Finally, the protein sample was injected at the injection end using a vacuum at -0.5 psi for 5 seconds.

Fig. 2 shows the experimental results of capillary zone electrophoresis when SDS in a concentration of 3 mM is added to a protein sample with no NaOH rinsing between runs. In Fig. 2, the six plots correspond to the 5^{th} - 10^{th} runs of a single capillary which had previously undergone four electrophoresis runs. As seen in this figure, the relative positions of the

various significant peaks within a single plot is substantially the same across the six plots. Therefore, Fig. 2 demonstrates the reproducibility of results among the successive runs using the same protein sample with a single capillary.

While the present invention has been described with reference to certain preferred embodiments, it should be kept in the mind that variations of these embodiments are also within the scope of the present invention. For example, SDS may be added in a concentration other than that used in the examples. In general, the concentration of SDS should below its critical micelle concentration of 8 mM. And instead of adding the SDS to the protein sample, the SDS may instead be present in the buffer at the sample end.